

- Fig. 5. Tangential section of a specimen of *R. crinalis*, Schlüt (?), enlarged twelve times, from the Middle Devonian of Teignmouth. The specimen consists of two superposed layers or colonies, of which one is in the "*stellimicans*" state, while the other is normal. The former is here figured.
- Fig. 6. Vertical section of the normal layer of the specimen just referred to. The tubes in this layer are larger than those in the layer represented in fig. 5, and certainly belong to *R. crinalis*, Schlüt.
- Fig. 7. Tangential section of *Rhaphidopora crinalis*, Schlüt. (?), from the Middle Devonian of Dartington (coll. A. Champernowne), enlarged twelve times.
- Fig. 8. Vertical section of the same, similarly enlarged.
- Fig. 9. Tangential section of *Rhaphidopora* (?) sp., from the Middle Devonian of Teignmouth, enlarged twelve times.
- Fig. 10. Vertical section of the same, similarly enlarged.

L.—*Additional Remarks on the External Aspect of the Tunny.*
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THE head and some other parts of the specimen of *Orcynus thyanus* mentioned in the 'Annals' for April were reserved for a subsequent communication, and hence no special allusion was made to the teeth. These of course occur on the vomer, in which respect, as my friend Mr. Day (whose valuable and long-continued labours amongst the fishes of our own and foreign countries would alone command respect) says, it differs from such as the bonito (*Thynnus pelamys*), a very good example of which was caught near St. Andrews, and is now, thanks to Dr. J. Moir, in the University Museum. Mr. Day's drawing of the teeth was not specially alluded to otherwise than by the general statement that "the teeth are somewhat fancifully represented in all the figures." The facts are that in his plate about eighteen or twenty teeth occur in a lateral view along the premaxillæ and maxillæ, and about fourteen or fifteen in the mandible. In the adult male about fifty occur in each of the series above mentioned. A similar criticism applies to his illustration of the dentition of the bonito. I know it is very difficult to give an adequate representation of such a range of small teeth in a figure of the size of Mr. Day's, and only allude to this to indicate that accuracy was the sole aim of my remarks.

In regard to the dorsal spines* there is a decided divergence between the figure in Day's 'British and Irish Fishes' and the example at St. Andrews, since the first spine is much

* These are thirteen in number.

more powerful—broader at the base and hence more rapidly tapered. Unfortunately Mr. Day does not state (and this is important) whether his figure is taken from a small or a large example, since the relative proportions between the length of the spines and the depth of the body probably undergo changes during growth. The first spine is one which even the uninitiated would call powerful. Another way of looking at the comparative lengths of the spine and other parts than that adopted by Mr. Day is to measure it (the spine) accurately by compasses in the figure in the 'British and Irish Fishes,' and then pass the compasses downward over the body, when it is found that at the second sweep of the instrument the free tip slightly exceeds the ventral outline. In the fresh example here nearly three such steps were necessary to clear the ventral margin.

If the premaxillary and maxillary region in the recent animal be measured with calipers, and the instrument then be turned backward to the opercular margin, the observer will find that two steps require to be taken to reach the latter (opercular margin). If this be done in Mr. Day's figure it will be found that the second sweep of the compasses exceeds the opercular margin by about a fourth. The measurements in the case of the "snout" and the "eye" mentioned by Mr. Day give the results he states, though in his figure the distance exceeds $2\frac{2}{3}$ (that for the larger example in the British Museum). The eye in the figures is as stated in my paper when compared with the fresh example. Further, if a vertical line be drawn along the posterior margin of the operculum, it will be found to approach the first dorsal spine too closely in Day's figure, thus additionally demonstrating what was mentioned with regard to the head. A reference to Mr. Couch's figure will also clear up the situation on this point, as well as bring out the fact that the origin of the pectoral is considerably in advance of a vertical line from the first dorsal spine, instead of being touched by it, as in the 'British and Irish Fishes.' Couch, it is true, says in his description that the first dorsal begins nearly above the origin of the pectoral; but his figure more closely accords with nature in this respect.

The relative positions of the second dorsal and the anal fins may vary; but such cannot be allowed to rest on facts derived from stuffed specimens. If it were so, the novelty of the origin of one pectoral in front of the other could in the same manner be stated of the bonito in the St. Andrews University Museum. In the tunny so characteristically was the anal behind the vertical line from the posterior base of the second dorsal,

that in severing the trunk by a vertical incision for convenience in maceration the second dorsal fin remained on the anterior, the anal on the posterior moiety. If a reference be made to Couch's figure, this feature will be apparent at a glance; and the author had the advantage of familiarity with fresh specimens. The shape of the pectoral fin in Mr. Day's figure, as well as that of the anal, does not correspond with that in the fresh specimen; and as the pectoral in the stuffed bonito in the museum here agrees with the latter, it is probable that the taxidermist has dragged out the inner rays too prominently in the specimen figured.

No allusion has been made by Mr. Day in his rejoinder to the finlets, which deviate from nature in contour and character not only in his figure of the tunny, but likewise in the bonito; and since the character of these fins is apparently more or less uniform, perhaps the illustrations of the albacore and pelamid may also be included in the criticism. An isolated figure of one of these is given in the plate formerly alluded to *, and, moreover, they were carefully photographed when fresh. The taxidermist has had some trouble (or else the skin and its appendages must have been very pliant) to get these organs into the "taut" and wholly unnatural position represented in the figures criticised †. Considerable force could not accomplish this in the specimen at St. Andrews even after five month's partial maceration.

Mr. Day refers to the accidental placing of *bubalis* instead of *scorpius* opposite the title "The Short-spined *Cottus*," on p. 433 of the 'Annals' for June 1885. He is probably unaware that the "correction" he alludes to existed in print a month or two previous to June 1885, and was issued ‡ about the time the paper he notices was published; indeed the slip must have occurred when copying from the proof of the former. Moreover, in the paper in the 'Annals' the title (*C. scorpius*) occurs in the explanation of the plate.

The foregoing remarks will show that it is hazardous to rely on a stuffed animal unless special precautions, by photographs and otherwise, be taken in the preparation, and that plate xxxv. of Mr. Day's 'British and Irish Fishes' does not adequately represent nature.

* *Vide* Fourth Annual Report of the Fishery Board for Scotland.

† Subsequent desiccation may have increased the effect, though it has not done so in the bonito at St. Andrews.

‡ Third Report of the Fishery Board for Scotland, p. 59.